

Scenario — PV

Just an apartment Austria - Salzburg 47.783, 13.067

Name	Slope °	Azimuth °	Wp	Wall d/h m	Face	Bifacial	Wp counted
Total counted			0				

Location: The apartment example. I lived there from 1978 to 1995. Small only one room apartment in the highest floor. Heat and DHW delivered by a central system. So in the example is heat demand 0 and 0 DHW liters because they are both not created by the own electric system. The pin location is a rounding error. The real location is house 43 at the south facing facade.

Database PVGIS-SARAH3 2005-2023 loss 14 % azimuth 0 = south, 90 = west, -90 = east.

Price bands and charts use UTC+1 from longitude (15° per hour), not the political time zone.

Peak hour 2005-01-01 01:10 local (00:10 UTC) 0 W 0.000 W/Wp of 0 Wp.

Database gaps: 0 days with 0 yield while the sun reached the horizon at noon. Yield charts skip them. The simulation uses the lowest-yield day of that month.

Sell when the export price is above 0. At 0 cent export PV yield only, not the battery. Do not sell when the earning is negative. At 15:00 winter time, battery export is only the kWh that would not fit in the next 72 h.



Scenario — house, heat pump, battery
Just an apartment Austria - Salzburg 47.783, 13.067

Chapter	Parameter	Value
Building	Design out / in / heat	-10.0 °C / 20.0 °C / 0.0 W
	Heat on / cool on / ground	22.0 °C / 25.0 °C / 10.0 °C
	Curve / flow min / max	0.4 / 25.0 °C / 55.0 °C
	Thermal mass of the house	25.0 kWh/K
	Household only	4.0 kWh/day
DHW	Litres at 40 °C / tank	0.0 L tank 42.0 °C 8-18 h
	Water out of the pipe Q1-Q4	8 °C 10 °C 12 °C 10 °C
Heat pump	Source	air and ground
	COP –10/0/10 @ 35 °C	2.4 3.4 4.5
	COP –10/0/10 @ 50 °C	1.9 2.6 3.3
	kW –10/0/10 @ 35 °C	4 5 6
	kW –10/0/10 @ 50 °C	3.5 4.5 5
Battery	kWh / C-rate / SOC min-max-start	0.0 kWh C 0.5 5 / 95 / 50 %
	Nameplate	—
	Charge / discharge η	95 % / 90 %
Grid	Inverter / grid connection	4.0 kW / 4.0 kW
	Max export	4.0 kW
	Import cap Jan-Jun kW	Jan 2 Feb 2 Mar 2 Apr 2 May 2 Jun 2
	Import cap Jul-Dec kW	Jul 2 Aug 2 Sep 2 Oct 2 Nov 2 Dec 2
Cars	Lunch DC / night AC	0.0 kWh @ 30.0 kW night 10.0 kWh @ 4.0 kW

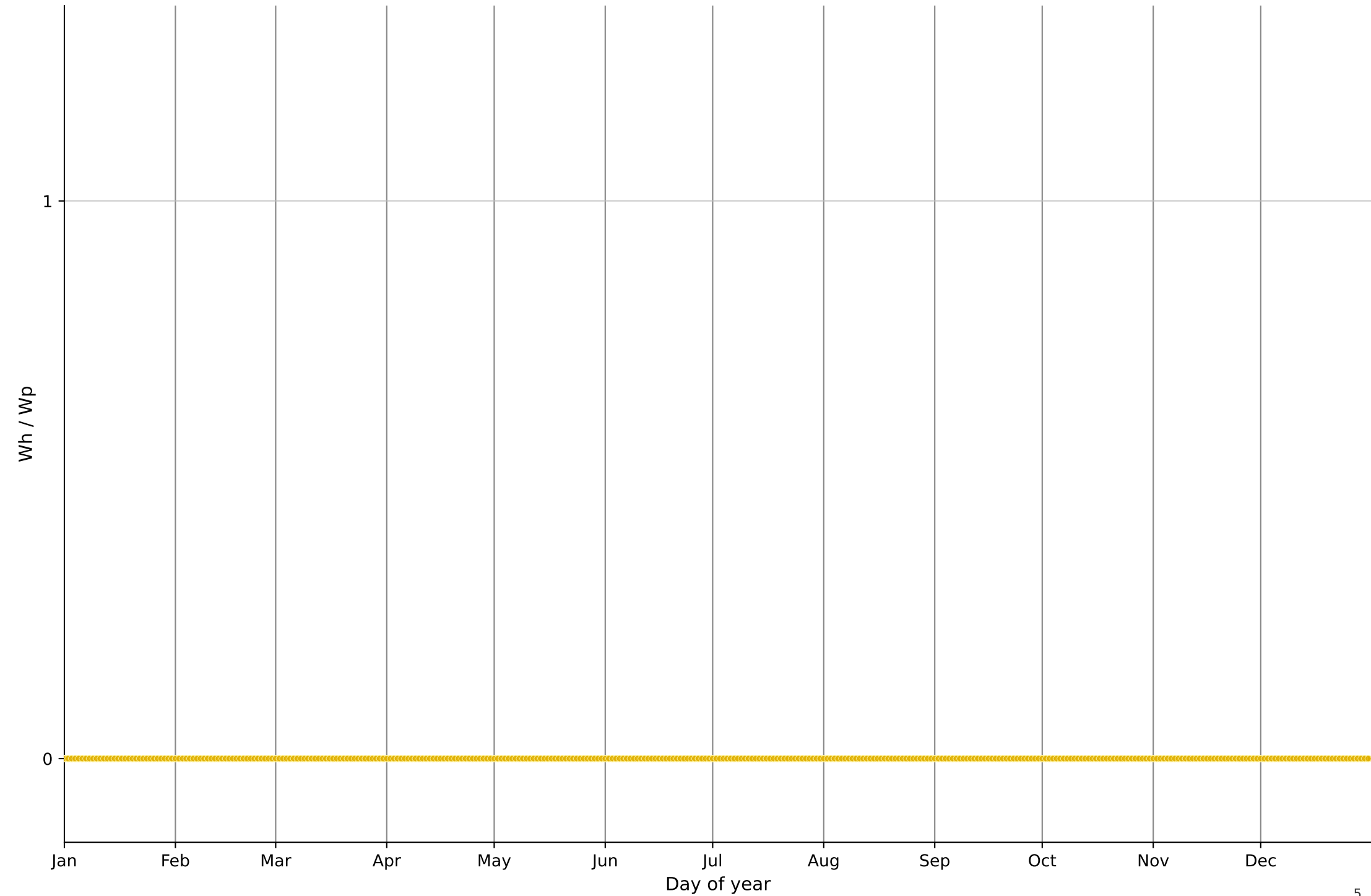
Records 1-10
Austria - Salzburg 47.783, 13.067

No photovoltaic installed.

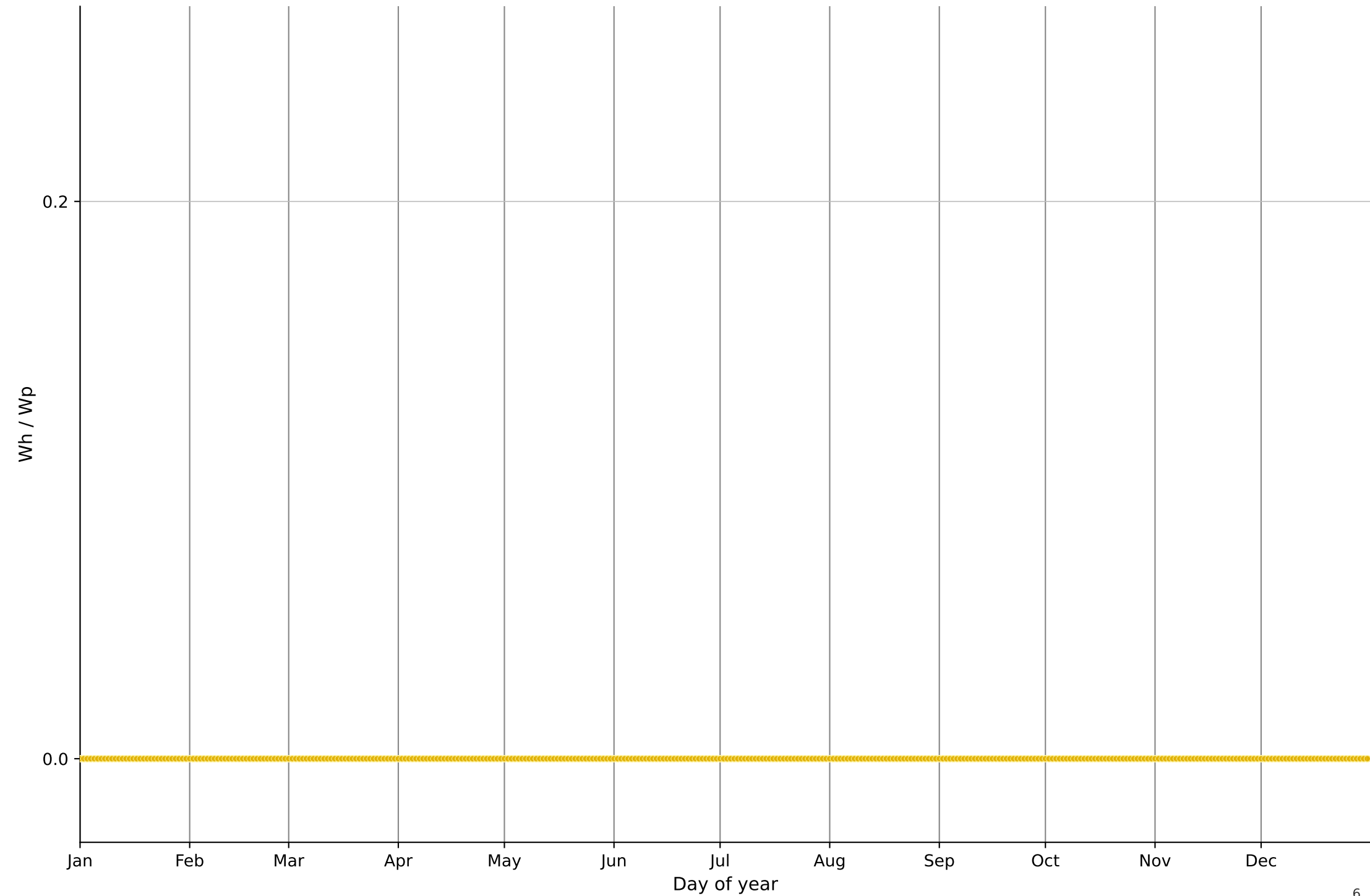
Records of each photovoltaic field
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No photovoltaic installed.

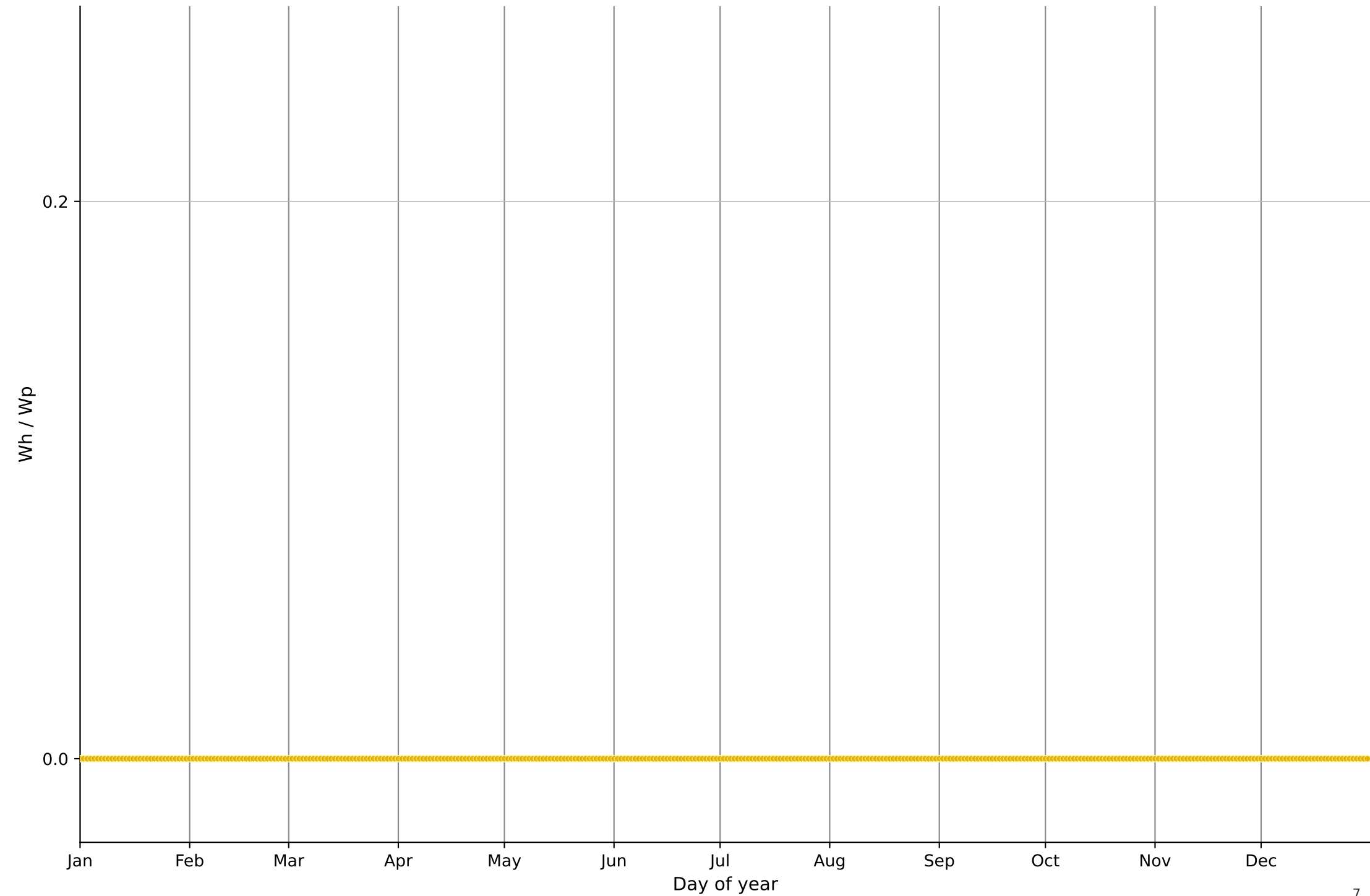
Yield distribution for each day — Wh / Wp of all PV together
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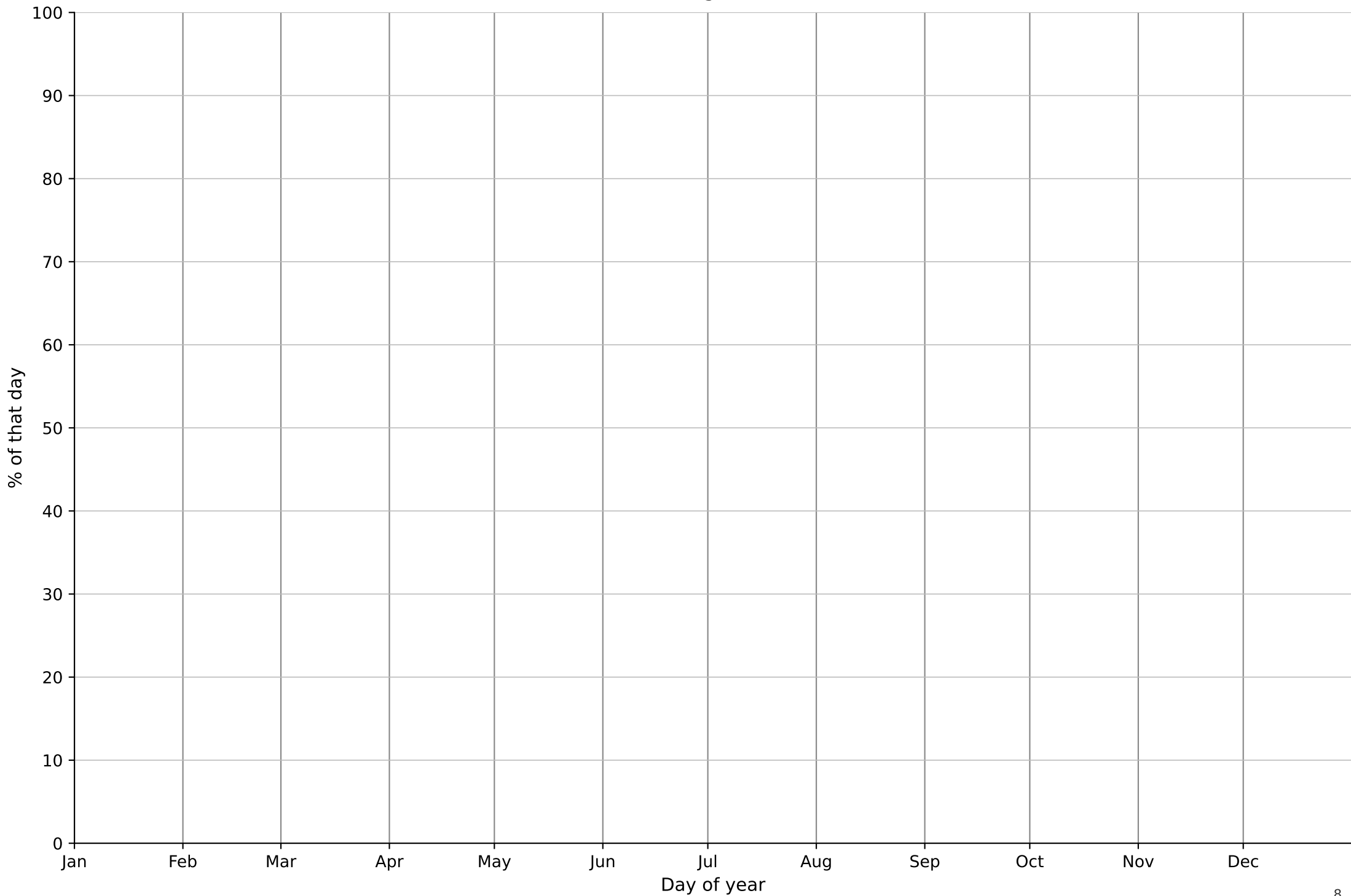
Yield distribution for each day — Wh / Wp of all PV together — 00:00-09:00
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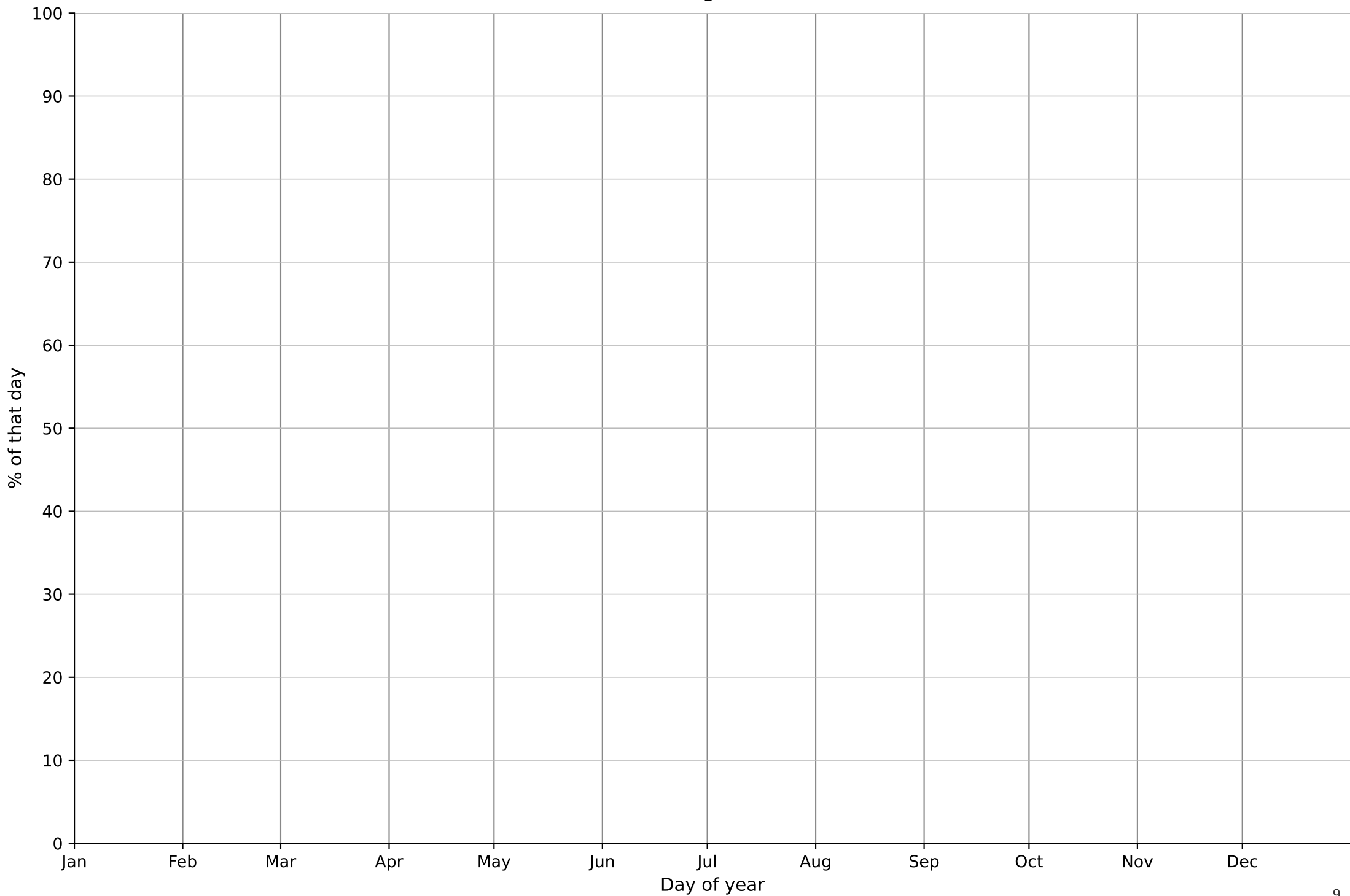
Yield distribution for each day — Wh / Wp of all PV together — 15:00-23:59
Austria - Salzburg 47.783, 13.067



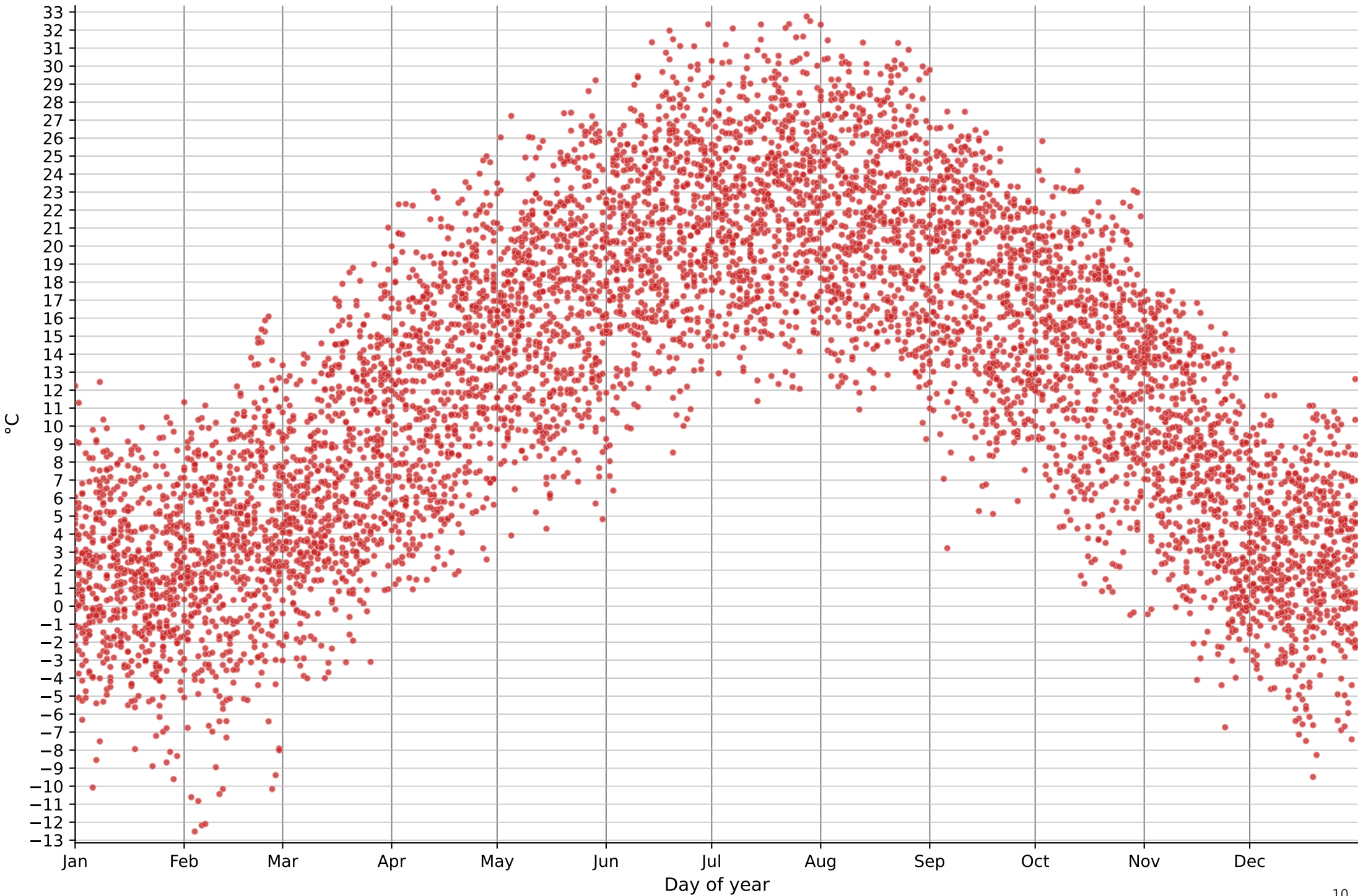
Share of the day's yield in 09:00-15:00 winter time
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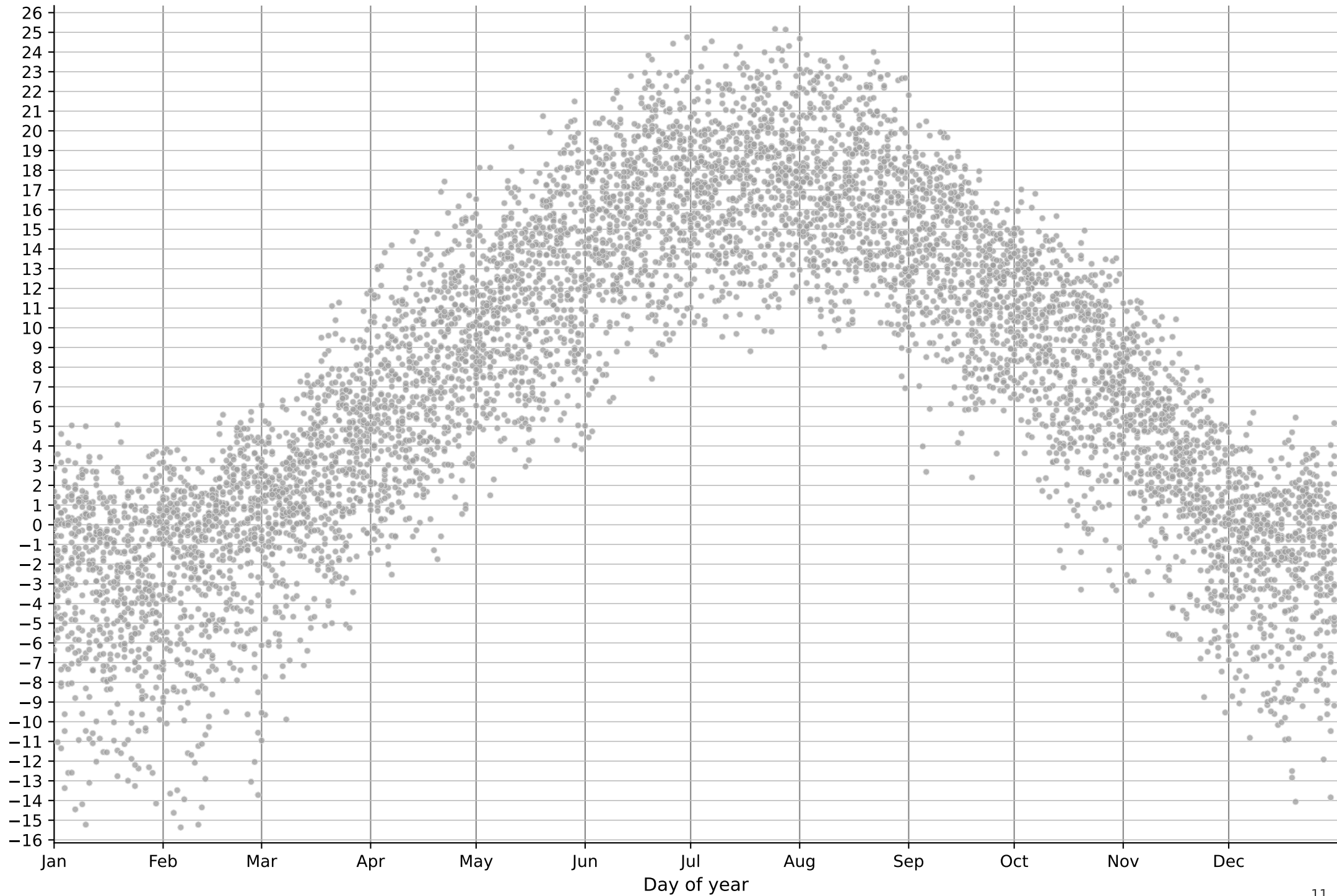
Share of the day's yield outside 09:00-15:00 winter time
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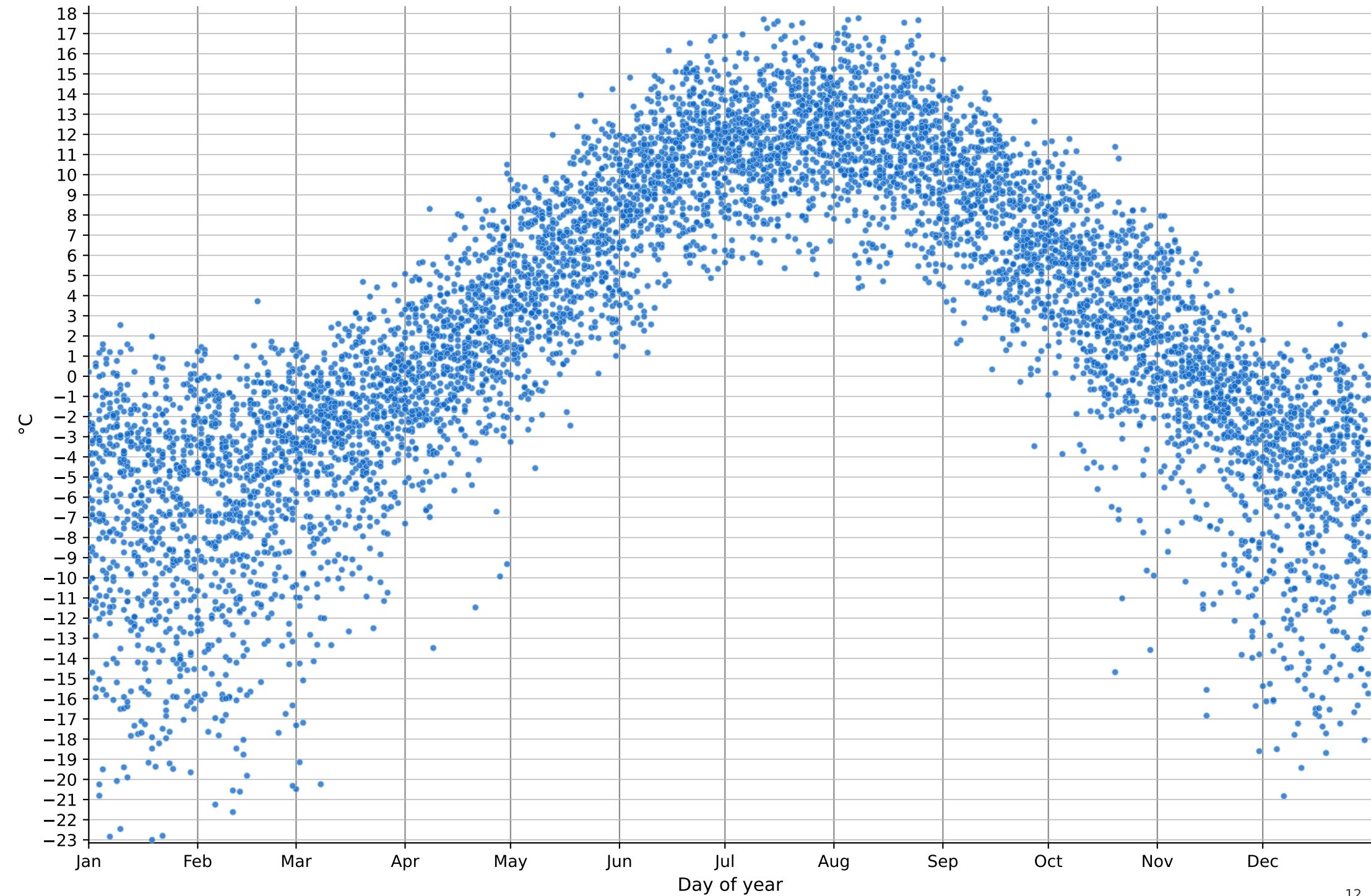
Highest temperature of each day
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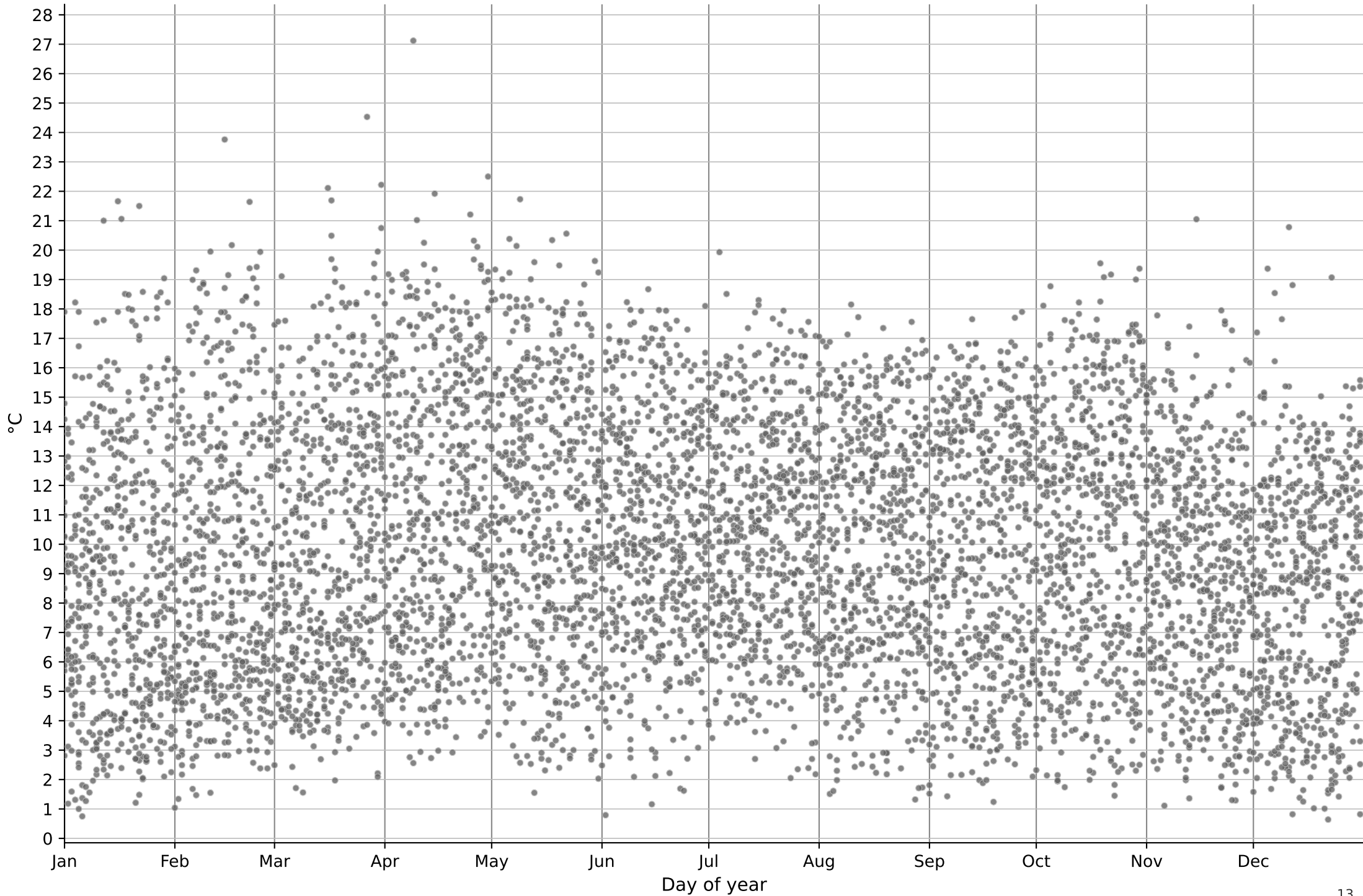
Average temperature of each day
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Lowest temperature of each day
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Difference between highest and lowest temperature of each day
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Monthly and yearly specific yield (kWh/kWp = Wh/Wp)
Austria - Salzburg 47.783, 13.067

Month / year		All together
January	Maximum	0.00
	average	0.00
	minimum	0.00
February	Maximum	0.00
	average	0.00
	minimum	0.00
March	Maximum	0.00
	average	0.00
	minimum	0.00
April	Maximum	0.00
	average	0.00
	minimum	0.00
May	Maximum	0.00
	average	0.00
	minimum	0.00
June	Maximum	0.00
	average	0.00
	minimum	0.00
July	Maximum	0.00
	average	0.00
	minimum	0.00
August	Maximum	0.00
	average	0.00
	minimum	0.00
September	Maximum	0.00
	average	0.00
	minimum	0.00
October	Maximum	0.00
	average	0.00
	minimum	0.00
November	Maximum	0.00
	average	0.00
	minimum	0.00
December	Maximum	0.00
	average	0.00
	minimum	0.00
All years	Maximum	0.0
	average	0.0
	minimum	0.0

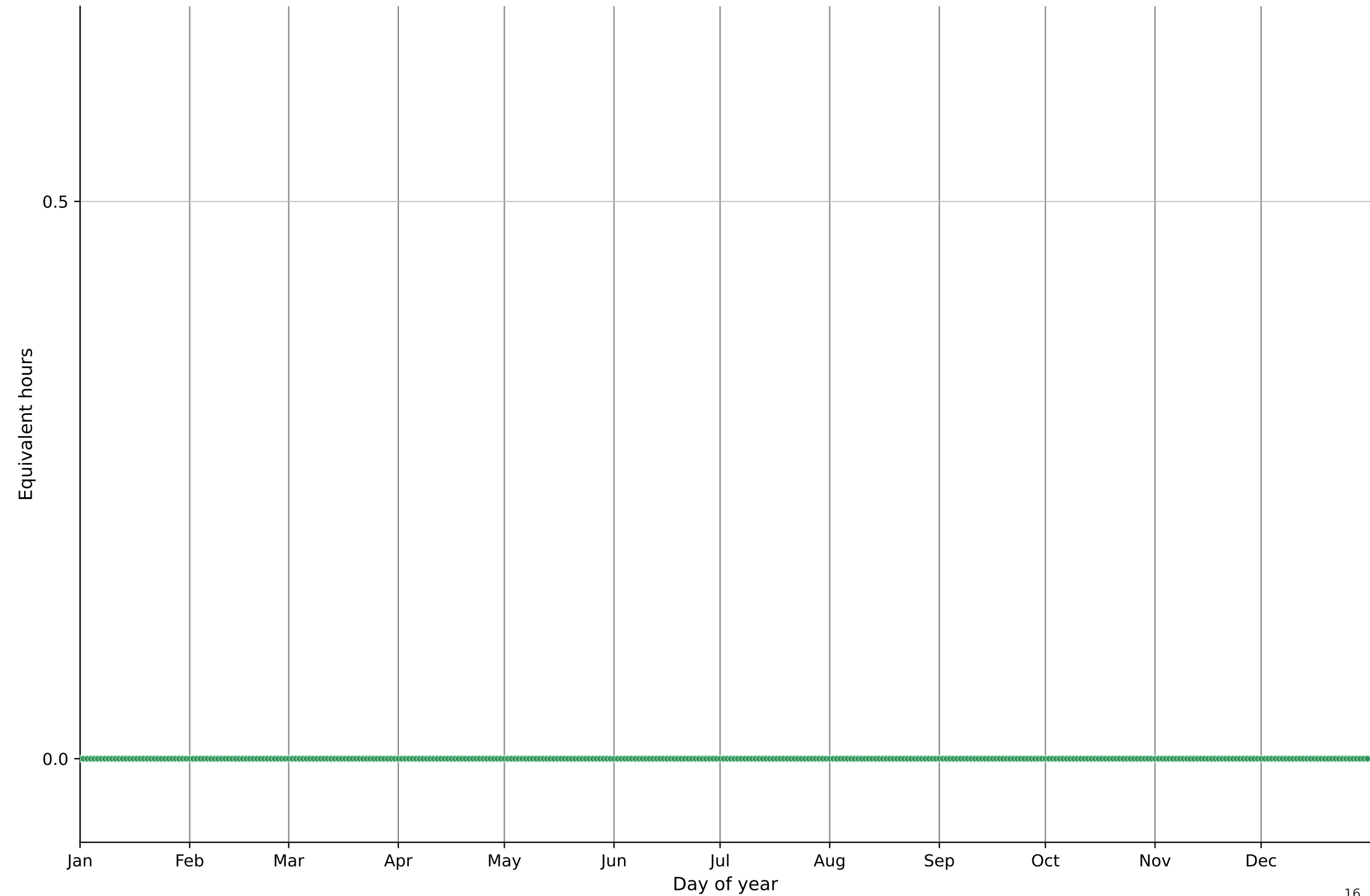
Highest combined yield hour: 2005-01-01 00:10 UTC 0.0 W (0.000 W/Wp) of 0 Wp installed. Use this hour to size battery charge power.

Monthly and yearly total yield (kWh)
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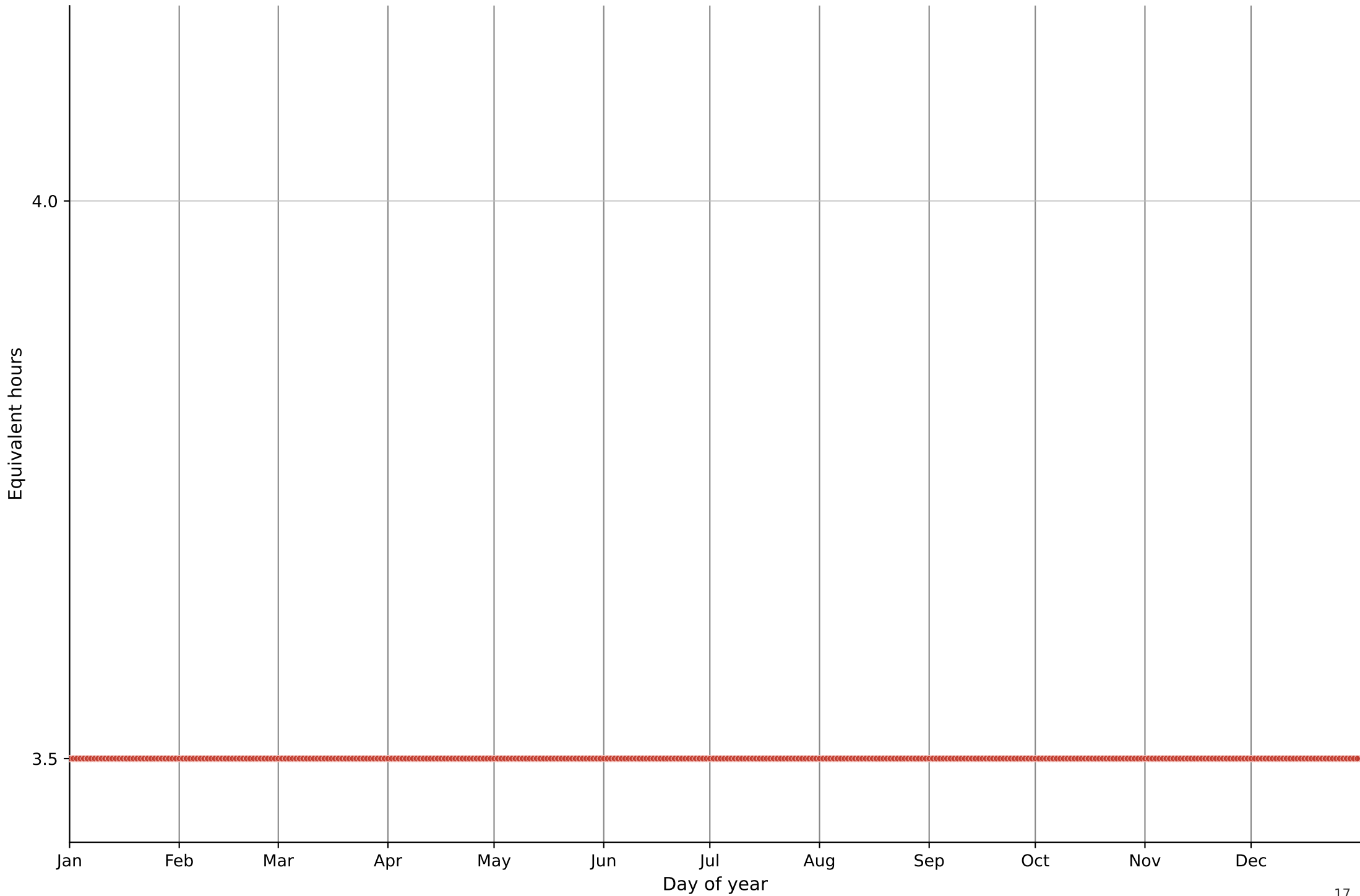
Month / year		All together
January	Maximum	0.0
	average	0.0
	minimum	0.0
February	Maximum	0.0
	average	0.0
	minimum	0.0
March	Maximum	0.0
	average	0.0
	minimum	0.0
April	Maximum	0.0
	average	0.0
	minimum	0.0
May	Maximum	0.0
	average	0.0
	minimum	0.0
June	Maximum	0.0
	average	0.0
	minimum	0.0
July	Maximum	0.0
	average	0.0
	minimum	0.0
August	Maximum	0.0
	average	0.0
	minimum	0.0
September	Maximum	0.0
	average	0.0
	minimum	0.0
October	Maximum	0.0
	average	0.0
	minimum	0.0
November	Maximum	0.0
	average	0.0
	minimum	0.0
December	Maximum	0.0
	average	0.0
	minimum	0.0
All years	Maximum	0
	average	0
	minimum	0

Highest combined yield hour: 2005-01-01 00:10 UTC 0.0 W (0.000 W/Wp) of 0 Wp installed. Use this hour to size battery charge power.

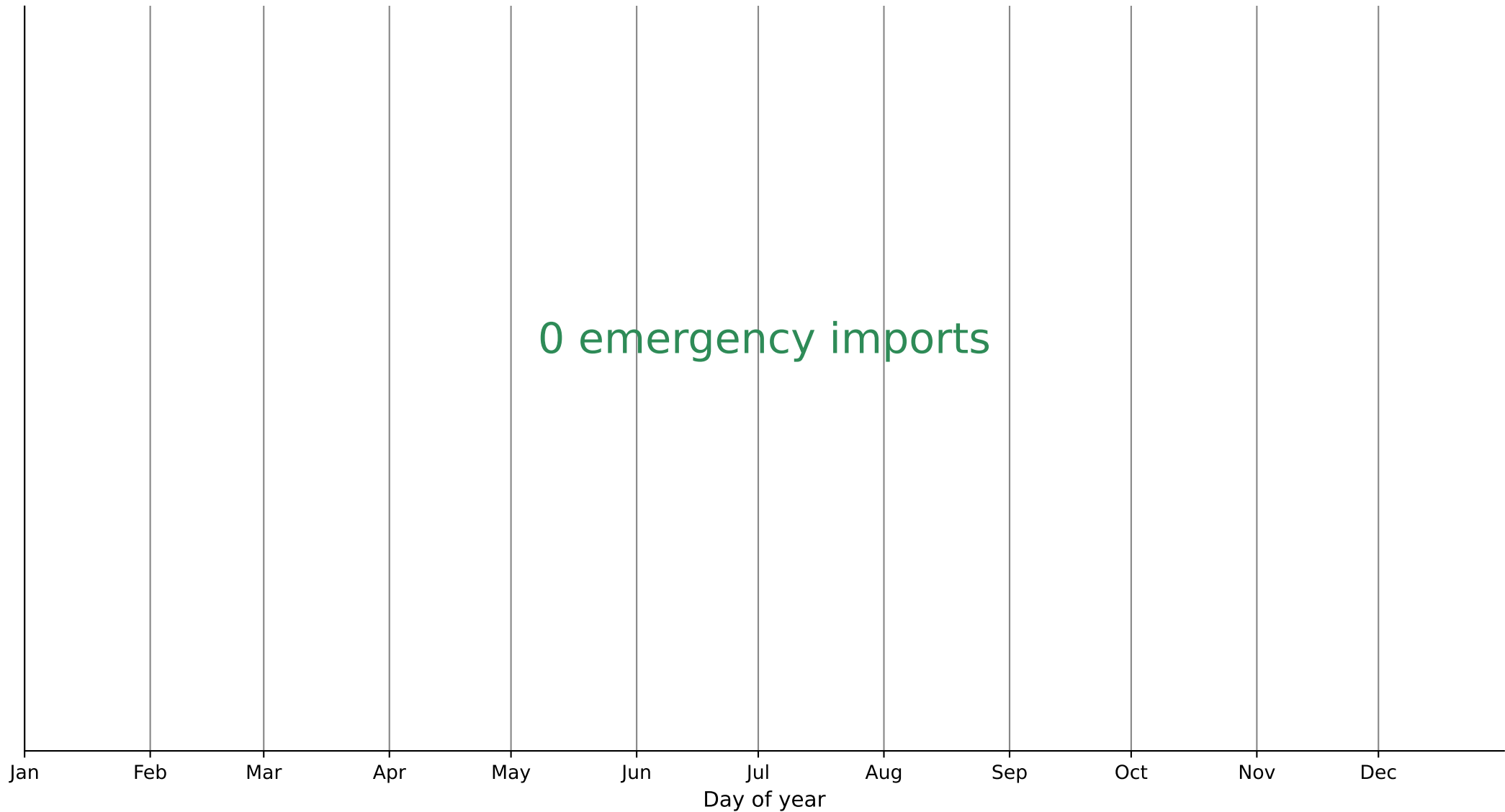
Export energy as equivalent hours (kWh / grid kW)
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Import energy as equivalent hours (kWh / grid kW)
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Emergency import hours: 0 days with an emergency: 0
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Emergency = this hour's grid import is above the month's max import kW. 2 kW means up to 48 kWh in 24 hours. More than 2 kW in an hour is the higher grid fee. Import inside that cap is not an emergency. Preferred cheap hours are 00:00-06:00 and 09:00-15:00 winter time.

Energy in kWh
Austria - Salzburg 47.783, 13.067

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	All
Export to grid													
month Maximum	0	0	0	0	0	0	0	0	0	0	0	0	0
month average	0	0	0	0	0	0	0	0	0	0	0	0	0
month minimum	0	0	0	0	0	0	0	0	0	0	0	0	0
day Maximum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
day average	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
day minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Import from grid													
month Maximum	434	406	434	420	434	420	434	434	420	434	420	434	5124
month average	434	395	434	420	434	420	434	434	420	434	420	434	5113
month minimum	434	392	434	420	434	420	434	434	420	434	420	434	5110
day Maximum	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
day average	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
day minimum	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
Total energy used for house													
month Maximum	434	406	434	420	434	420	434	434	420	434	420	434	5124
month average	434	395	434	420	434	420	434	434	420	434	420	434	5113
month minimum	434	392	434	420	434	420	434	434	420	434	420	434	5110
day Maximum	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
day average	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
day minimum	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0

Month rows: kWh in that month. Day rows: best / average / worst day.
Total energy used for house = household + car + heating + cooling + DHW + direct electric.
PV not exported and not marked wasted is still in the battery, or could not leave because the grid was already full. It is not house use.

Energy by price
Austria - Salzburg 47.783, 13.067

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	All
Export													
month Maximum	0	0	0	0	0	0	0	0	0	0	0	0	0
month average	0	0	0	0	0	0	0	0	0	0	0	0	0
month minimum	0	0	0	0	0	0	0	0	0	0	0	0	0
day Maximum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
day average	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
day minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Import													
month Maximum	120	112	120	107	111	107	111	111	107	120	116	120	1353
month average	119	108	119	106	110	107	110	110	106	119	115	119	1349
month minimum	118	108	118	106	109	106	109	109	106	118	114	118	1348
day Maximum	4.0	4.0	4.0	3.7	3.7	3.7	3.7	3.7	3.7	4.0	4.0	4.0	4.0
day average	3.8	3.8	3.8	3.5	3.6	3.6	3.5	3.6	3.5	3.8	3.8	3.8	3.7
day minimum	3.4	3.4	3.4	3.1	3.1	3.1	3.1	3.1	3.1	3.4	3.4	3.4	3.1
Peak grid fee													
month Maximum	7	7	7	7	7	7	7	7	7	7	7	7	82
month average	7	7	7	7	7	7	7	7	7	7	7	7	82
month minimum	7	7	7	7	7	7	7	7	7	7	7	7	82
day Maximum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
day average	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
day minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Import incl. peak fee													
month Maximum	126	118	126	114	117	114	117	117	114	126	122	126	1434
month average	126	115	126	113	117	113	117	117	113	126	122	126	1431
month minimum	125	114	125	112	116	112	116	116	112	125	121	125	1430
day Maximum	4.0	4.0	4.0	3.7	3.7	3.7	3.7	3.7	3.7	4.0	4.0	4.0	4.0
day average	3.8	3.8	3.8	3.5	3.6	3.6	3.5	3.6	3.5	3.8	3.8	3.8	3.7
day minimum	3.4	3.4	3.4	3.1	3.1	3.1	3.1	3.1	3.1	3.4	3.4	3.4	3.1
Balance													
month Maximum	-125	-114	-125	-112	-116	-112	-116	-116	-112	-125	-121	-125	-1430
month average	-126	-115	-126	-113	-117	-113	-117	-117	-113	-126	-122	-126	-1431
month minimum	-126	-118	-126	-114	-117	-114	-117	-117	-114	-126	-122	-126	-1434
day Maximum	-3.4	-3.4	-3.4	-3.1	-3.1	-3.1	-3.1	-3.1	-3.1	-3.4	-3.4	-3.4	-3.1
day average	-3.8	-3.8	-3.8	-3.5	-3.6	-3.6	-3.5	-3.6	-3.5	-3.8	-3.8	-3.8	-3.7
day minimum	-4.0	-4.0	-4.0	-3.7	-3.7	-3.7	-3.7	-3.7	-3.7	-4.0	-4.0	-4.0	-4.0

Currency in Your units. Import and export use the cent/kWh of that hour. Peak fee 6.33 / kW / month is the highest import hour of the month (hourly stand-in for the 15-minute peak) and is added to that month's Sell only when export is above 0. At 0 cent, export PV yield only, not the battery. Do not sell when the earning is negative.

Export in kWh during price hours
Austria - Salzburg 47.783, 13.067

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	All
Export total													
month Maximum	0	0	0	0	0	0	0	0	0	0	0	0	0
month average	0	0	0	0	0	0	0	0	0	0	0	0	0
month minimum	0	0	0	0	0	0	0	0	0	0	0	0	0
day Maximum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
day average	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
day minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Export during high price hours													
month Maximum	0	0	0	0	0	0	0	0	0	0	0	0	0
month average	0	0	0	0	0	0	0	0	0	0	0	0	0
month minimum	0	0	0	0	0	0	0	0	0	0	0	0	0
day Maximum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
day average	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
day minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Export during medium price hours													
month Maximum	0	0	0	0	0	0	0	0	0	0	0	0	0
month average	0	0	0	0	0	0	0	0	0	0	0	0	0
month minimum	0	0	0	0	0	0	0	0	0	0	0	0	0
day Maximum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
day average	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
day minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Export during low price hours													
month Maximum	0	0	0	0	0	0	0	0	0	0	0	0	0
month average	0	0	0	0	0	0	0	0	0	0	0	0	0
month minimum	0	0	0	0	0	0	0	0	0	0	0	0	0
day Maximum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
day average	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
day minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

kWh exported while that price band was active. Not the money. Winter time. High 06:00–09:00 and 17:00–20:00, sold first. Low 09:00–15:00, sold last. Medium is the rest.

Heat pump
Austria - Salzburg 47.783, 13.067

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	All
Heating													
month Maximum	0	0	0	0	0	0	0	0	0	0	0	0	0
month average	0	0	0	0	0	0	0	0	0	0	0	0	0
month minimum	0	0	0	0	0	0	0	0	0	0	0	0	0
day Maximum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
day average	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
day minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cooling													
month Maximum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
month average	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
month minimum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
day Maximum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
day average	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
day minimum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DHW													
month Maximum	0	0	0	0	0	0	0	0	0	0	0	0	0
month average	0	0	0	0	0	0	0	0	0	0	0	0	0
month minimum	0	0	0	0	0	0	0	0	0	0	0	0	0
day Maximum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
day average	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
day minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Direct electric													
month Maximum	0	0	0	0	0	0	0	0	0	0	0	0	0
month average	0	0	0	0	0	0	0	0	0	0	0	0	0
month minimum	0	0	0	0	0	0	0	0	0	0	0	0	0
day Maximum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
day average	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
day minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

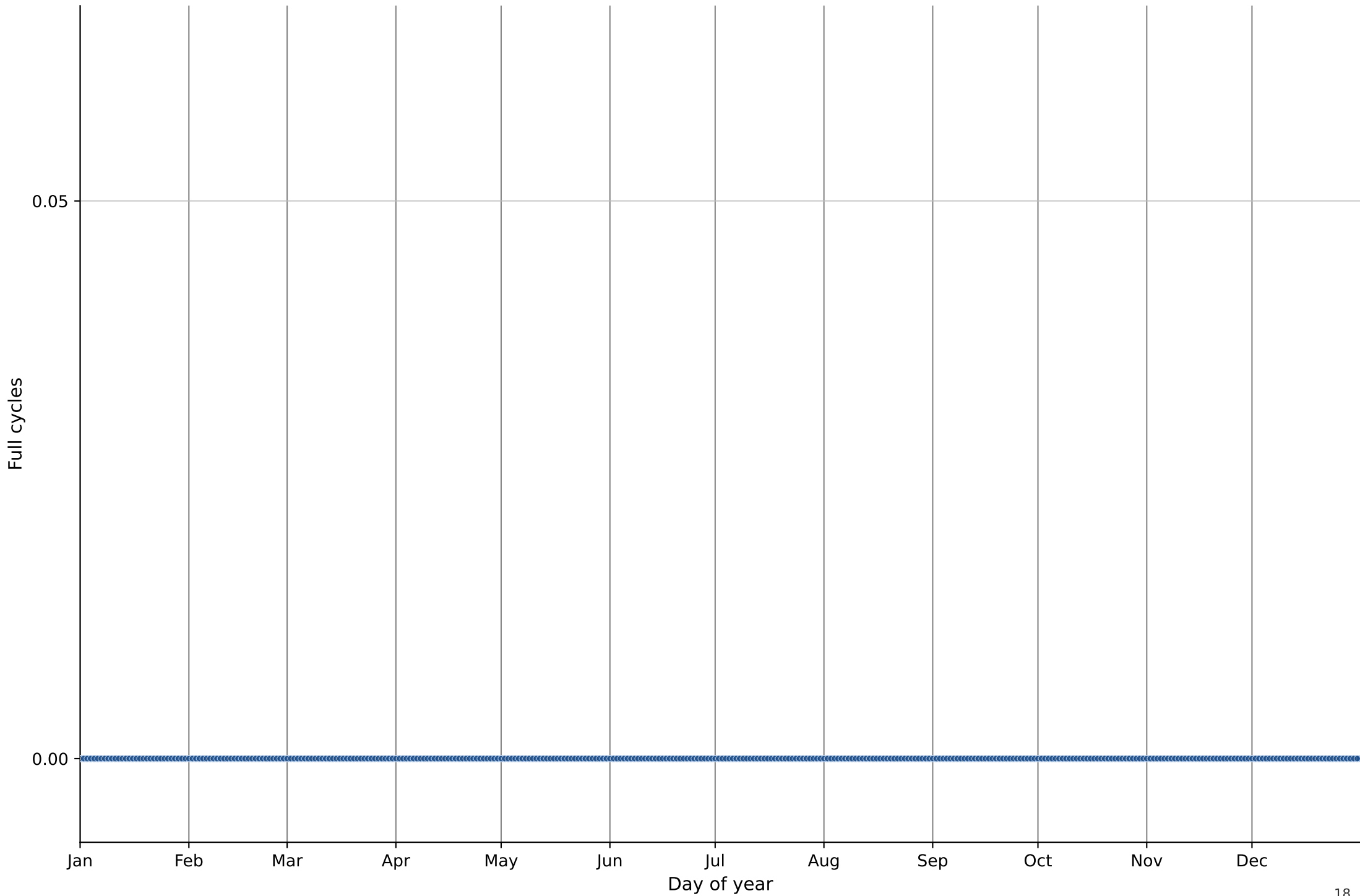
Heating, cooling and DHW are electricity. Direct electric is the part the heat pump could not cover.

Battery
Austria - Salzburg 47.783, 13.067

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	All
Wasted													
month Maximum	0	0	0	0	0	0	0	0	0	0	0	0	0
month average	0	0	0	0	0	0	0	0	0	0	0	0	0
month minimum	0	0	0	0	0	0	0	0	0	0	0	0	0
day Maximum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
day average	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
day minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Full cycles													
month Maximum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
month average	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
month minimum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
day Maximum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
day average	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
day minimum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Charge C													
month Maximum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
month average	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
month minimum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
day Maximum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
day average	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
day minimum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Discharge C													
month Maximum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
month average	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
month minimum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
day Maximum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
day average	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
day minimum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

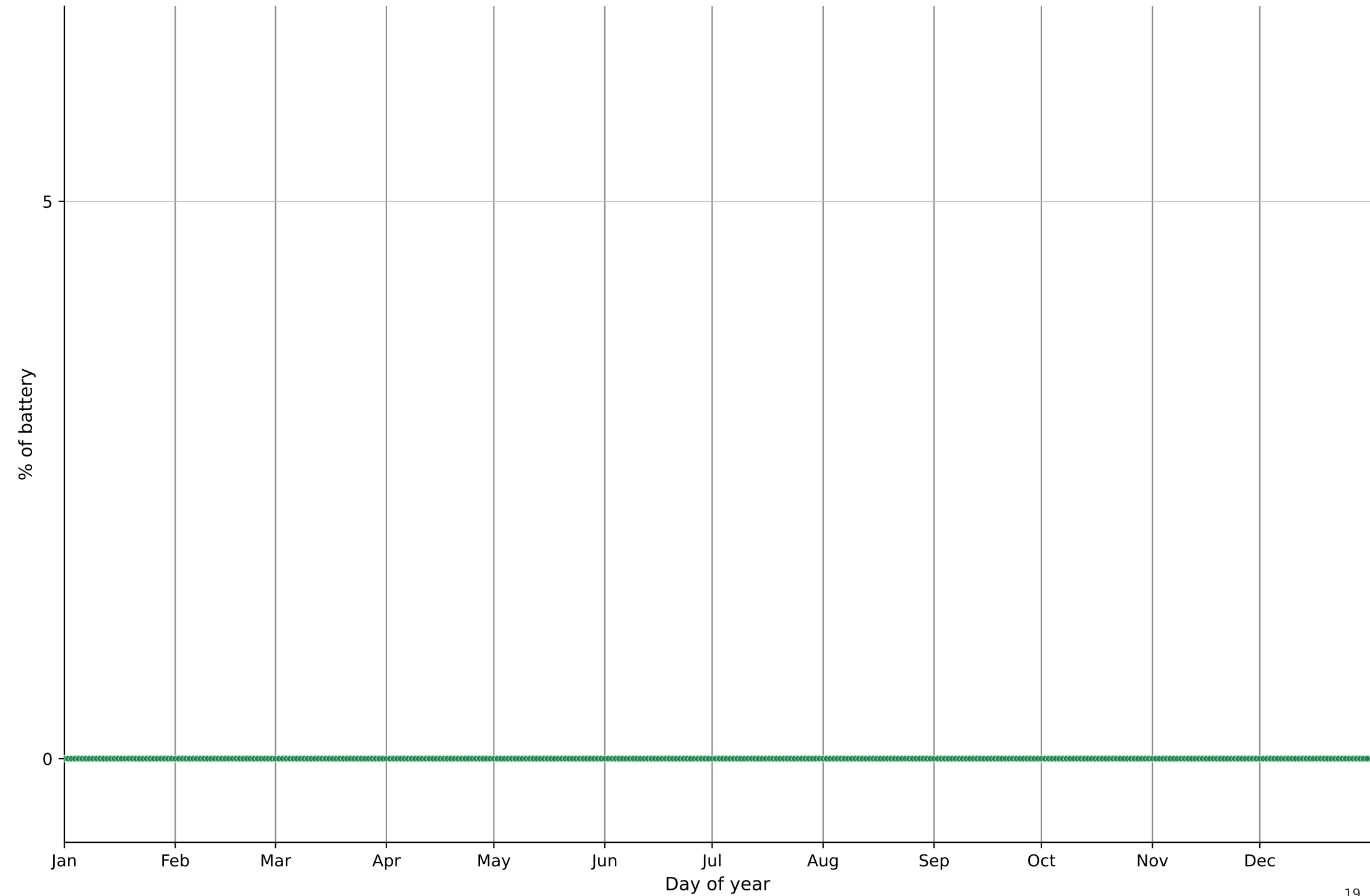
Wasted = PV left when the export price is negative and the battery is full. Full cycles = discharge kWh / 160 kWh. Battery export only into hours whose export price is above 0, highest price first. At 0 cent only

Battery cycles per day (discharge / 160 kWh)
Austria - Salzburg 47.783, 13.067



Battery max charge state per day (160 kWh = 100 %)

Austria - Salzburg 47.783, 13.067



Battery min charge state per day (160 kWh = 100 %)

Austria - Salzburg 47.783, 13.067

